

INSTRUCTION IN BRAILLE WRITING :
ITS EFFECTS ON SOME OF THE
LANGUAGE ARTS SKILLS

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INSTRUCTION IN BRAILLE WRITING: ITS EFFECTS ON SOME
OF THE LANGUAGE ARTS SKILLS

by

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A Study Presented to the Faculty of the
Department of Special Education
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Robert M. Ogden

TABLE OF CONTENTS

	PAGE
LIST OF TABLES	v
INTRODUCTION	1
THE PROBLEM AND THE PURPOSE	4
REVIEW OF THE LITERATURE	7
The Literature on Braille Writing	7
The Literature on Related Language Arts Skills	14
PROCEDURES	20
The Subjects	21
Measures of Assessment	23
Pretreatment Testing	27
Materials and Methods Used in the Treatment	27
Posttreatment Testing	31
RESULTS	31
The Braille Writing Test	31
The Reading Comprehension Test	35
The Oral Reading Test	36
The Spelling Test	37
Correlations	39
CONCLUSIONS	41
SUMMARY	46
REFERENCES	48

TABLE OF CONTENTS (Continued)

	PAGE
APPENDIXES	53
A INDIVIDUAL RESULTS	54
B WORD LIST USED TO ASSESS SPELLING ABILITY	60
C SAMPLE LESSON	62

LIST OF TABLES

TABLE		PAGE
1	Braille and Pencil Writing Rates as Reported by Ricksecker	9
2	Writing Speeds Using Two Different Types of Slates as Reported by Barr	10
3	Spelling Results on Stanford and Metropolitan Tests as Reported by Godshall	20
4	The Subjects Assigned to the Groups	23
5	Contents of the Lessons	28
6	Results of the Pretreatment Braille Writing Test	32
7	Group Results on the Braille Writing Test	33
8	<u>t</u> Test Comparison of the Gain Score Means in Writing	34
9	Group Results on the Reading Comprehension Test	35
10	Group Results on the Oral Reading Errors Test	36
11	Group Results on the Oral Reading Rate Test	36
12	Group Results on the Spelling Test	38
13	<u>t</u> Test Comparison of the Gain Score Means in Spelling	38
14	Pretest Correlations	40

LIST OF TABLES (Continued)

TABLE		PAGE
15	Individual Results on the Braille Writing Test	55
16	Individual Results on the Reading Comprehension Test	56
17	Individual Results on the Oral Reading Errors Test	57
18	Individual Results on the Oral Reading Rate Test	58
19	Individual Results on the Spelling Test	59

Introduction

Braille is a form of reading and writing which employs the use of embossed dots which are arranged in various combinations within a six-dot matrix. It is used by blind persons for reading, and to facilitate written communication in a variety of circumstances. It is used by the blind to record present thoughts and ideas for future reference. It makes possible direct written communication among blind persons, and the blind are also able to communicate in writing with sighted persons who have learned the braille code. It is usually the only form of written communication between the young school child who is blind and his teachers. Thus, braille is generally considered to be a basic tool in the education of blind children.

The early attempts to educate blind children encountered a major difficulty, there was no existent form of writing that they could master. Kugelmass (1951) quoted Valentin Haüy, the father of education of the blind, in a conversation with one of his pupils, "We can now print almost anything we wish." (This printing was accomplished using Roman line letters for embossing.) "First, however, I wish there was some way of teaching you to write, no matter how awkwardly (p. 47)." Louis Braille, the pupil, accepted this challenge and set out to develop a way of writing for himself and his fellow pupils.

Introduction

The purpose of this study is to investigate the effects of various factors on the growth and development of the human body. The study is designed to provide a comprehensive overview of the physical and physiological changes that occur during the human life cycle, from birth to old age. The research is based on a review of the existing literature and the results of various experiments and observations. The study is organized into several chapters, each dealing with a different aspect of human growth and development. The first chapter discusses the general principles of growth and development, including the role of genetics and the environment. The second chapter deals with the growth and development of the skeletal system, including the process of ossification and the changes in bone structure and density. The third chapter discusses the growth and development of the muscular system, including the process of muscle fiber growth and the changes in muscle strength and endurance. The fourth chapter deals with the growth and development of the cardiovascular system, including the changes in heart size and function and the development of the blood vessels. The fifth chapter discusses the growth and development of the respiratory system, including the changes in lung size and function and the development of the airways. The sixth chapter deals with the growth and development of the digestive system, including the changes in stomach and intestinal size and function and the development of the digestive enzymes. The seventh chapter discusses the growth and development of the reproductive system, including the changes in the size and function of the reproductive organs and the development of the reproductive hormones. The eighth chapter deals with the growth and development of the nervous system, including the changes in the size and function of the brain and the development of the peripheral nerves. The ninth chapter discusses the growth and development of the endocrine system, including the changes in the size and function of the endocrine glands and the development of the endocrine hormones. The tenth chapter deals with the growth and development of the immune system, including the changes in the size and function of the immune organs and the development of the immune response. The study concludes with a summary of the findings and a discussion of the implications for human health and well-being.

Kugelmass (1951) and Roblin (undated) related how Braille's childhood acquaintance with cumbersome and complicated dot writing systems, Charles Barbier's military code called "Night Writing" and later Sonography, gave Braille his idea. He reduced the writing area for each character to a six-dot matrix, $\begin{smallmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{smallmatrix}$, three dots high and two dots wide. He then devised a code of alphabet symbols which was simple enough for most blind persons to learn to use for reading and writing.

In 1829, Braille published his dot writing system, but it required 103 years for it to become completely accepted as the mode of reading and writing for the blind. Irwin (1955) and Farrell (1950) told of its competition first with embossed line letters, and later with other punctographic writing systems. Finally, in 1932, with the official adoption of Standard English Braille, a uniform system of writing, named after its inventor, Louis Braille, became the accepted reading and writing medium of all English-speaking blind people. Louis Braille's invention had immortalized him.

After 1932, only one problem remained to be solved, a problem mainly concerned with children and their educators. The 1932 agreement on Standard English Braille had recognized three levels or grades of braille. Louis Braille's original code had contained only letter symbols, punctuation

symbols, etc., and thus required the full spelling of every word written, a level known as Braille Grade 1. Materials produced in Grade 1 are bulky, and their use helps to retard the speed of reading and writing.

In the six-dot matrix now known as the braille cell, there is the possibility of 63 different dot combinations (two to the sixth power minus one), not all of which are utilized in the writing of Braille Grade 1. Through the years, various persons and groups had assigned word meanings and letter group meanings to these unused dot combinations, thus the braille contractions had come into being. It was the standardization of these contractions that had been accomplished in 1932, but two different contracted levels or grades remained; Braille Grade 1½ and Braille Grade 2. Braille Grade 1½ contained only 44 contractions with very few rules needed to govern their use in writing (Loomis, 1934). Braille Grade 2 originally used 185 contractions and abbreviated word forms, but now contains 189 such symbols, or 145 more than Braille Grade 1½. In order to form 189 contractions using only 63 dot combinations, it is necessary to assign multiple meanings to many of the braille symbols. In order to determine the meaning of a symbol, one must consider the way that it has been used and its location in the word or phrase. To accomplish this, a very complex set of rules to govern the use of Braille Grade 2 contractions is

necessary (Goldish, 1967). It was this variety of grades of braille which caused a problem after 1932. All future adult reading materials were to be embossed in Braille Grade 2 (Rodenberg, Irwin, & Meyer, 1934), but educators of young blind children favored the use of Braille Grade 1½ for the children's early reading and writing experiences (Langan, 1950; Niday, Rice, & Chatfield, 1950; Irwin, 1955). This practice necessitated each child's having to learn to read and write Braille Grade 2 at some later time in his schooling.

In the late 1940's, the "which grade of braille to teach" problem came to a head. Langan (1950) reported how the "back-yard research" of a few schools in attempting the teaching of reading and writing to primary children using fully contracted Braille Grade 2 was meeting with much success, and that the practice was spreading rapidly. Following comments both pro (Hooper, 1946) and con (Ziegel & Ostendorff, 1953), the question was finally settled so that Ashcroft and Henderson (1963) stated that in the teaching of blind children to read and write, "It is generally accepted as sound educational policy to introduce Grade 2 braille from the very first."

The Problem and the Purpose

The practice of introducing Braille Grade 2 from the beginning of children's reading experiences has proven to

have merit in most respects. But, as pointed out by Rodgers (1961), little or no attention has been given to the order in which contractions are introduced in the basic reading materials in regard to the degree of difficulty involved in learning the different contractions. Even so, by using contextual clues and related aids, most children are able to overcome this difficulty and develop a fair degree of reading proficiency. A parallel problem, the problem of concern in this study, is the difficulty created by a child's having to learn to write Braille Grade 2 in light of this unsystematic introduction of the contractions in reading. Reading, which admittedly is a complex process, requires only that the child be able to recognize and give meaning to the orthographic symbols which have been embossed with very close adherence to the rules of the braille code, while writing requires a more exact knowledge of the symbology to be used and, additionally, some knowledge of the rules which govern the use of the various symbols.

Early instruction in these tool subjects, reading and writing braille, usually involves much complementary learning. Children write material similar to what they have read and vice versa. But as children progress through school, the teaching of the tool subjects tends to become of secondary importance in relation to the teaching of subject matter. Also, as the children's experiences become more

numerous and varied, their writing needs tend to become more individualistic and the parallel teaching of the primary grades becomes less apparent even though a broader knowledge of his mode of writing becomes more necessary for each child. If the school meets this need during the years of writing instructions, then there is no problem, but a close examination of the written work of older blind children will reveal that for some this need has not been met.

To state the problem briefly, current practices used in the teaching of braille writing do not appear to meet the needs of some children, thus some do not write accurately. The problem was identified by the writer and through the comments of other teachers, teachers of older elementary and secondary school blind children.

Rodgers (1961) stated,

It does not appear that experiments, conducted under standard, scientific controls, have been made to determine the extent to which it is actually possible for children at elementary grade level to write accurate braille in light of the present practice of introducing contractions and abbreviated words with no regard to the order of difficulty (p. 67).

The purpose of the project was threefold. First, to determine the degree of accuracy with which older elementary school children write Braille Grade 2. Second, to determine if a series of lessons, which systematically presented various groups of related contractions along with the rules governing their use in braille writing, would have any

positive effect on the writing ability of older elementary school children. Third, to determine if such instruction would have any effect on the children's performance on tests of the related language arts skills of reading and spelling, and, if so, to what extent their performance was affected.

Review of the Literature

The review of the literature is comprised of two parts: a review of the literature on braille writing and a review of the literature on related language arts skills.

The Literature on Braille Writing

In reviewing the literature available, one soon reaches the conclusion that the subject of braille writing, especially in any of its aspects beyond the beginning instructional stage, has received little consideration from educators of blind children. Maxfield (1928) devoted one paragraph to the subject. Lowenfeld, Abel, and Hatlen (1969) described two types of writing apparatus, and discussed the problem of reversals during the early stages of instruction in writing with the slate and stylus. The American Foundation for the Blind Research Index (1968) failed to even list braille writing as a category. This same situation also pertained to Lende's (1953) work.

The literature reviewed yielded only four research oriented works during the past 30 years. Also located were

a few descriptive articles, and a few statements on the subject which usually seemed to be based on a combination of experience, opinion, and assumption.

Badgley (1940) reported a study which involved a frequency count of the various types of braille writing errors found in the written work of 125 school children. Although the account of the study included no specific data, the results reported are of interest. Badgley found that two major error types contributed the majority of errors found. They were reversal of the braille symbols and misuse of braille contractions. She concluded that part of the problem in the misuse of contractions was due to carelessness, but she also felt that a lack of knowledge of how to form some of the contraction symbols helped to contribute to the problem. The reader is reminded that Badgley's study was during the period when children wrote using Braille Grade 1½ which had 44 contracted forms and only a few rules to govern their use. It seems logical to assume that the current practice of writing using Braille Grade 2, with its 189 contracted forms and its complex set of rules, would tend to magnify the problem of contraction misuse.

Ricksecker (1932) compared the braille writing rate of blind children with the writing rate of sighted pupils using pencils and paper. His subjects were two blind eighth-grade pupils in a local day school program. Both were considered

to be fairly proficient in braille writing. They were timed writing the alphabet two different times and writing three different sentences. The type of writing apparatus used was not specified. Sighted classmates were also timed writing the same material using pencils and paper. Results are shown in Table 1.

Table 1
Braille and Pencil Writing Rates
as Reported by Ricksecker

Subjects	Alphabets		Sentences		
	1st	2nd	1st	2nd	3rd
Pencil Writing Means	31*	22.6	33.6	35.7	56.0
Braille Writing (Boy)	27	23	62	82	84
Braille Writing (Girl)	26	25	47	76	95

*All rates reported are in seconds.

Ricksecker concluded that the observed slower writing rate for braille would tend to handicap a blind child in most any educational endeavor.

Barr (1968) reported on the development of a new writing apparatus and the feasibility of its use with blind children. The "Simplified Slate," as she called the apparatus, utilizes a lower plate with raised six-dot cells

instead of the conventional indented six-dot cells. A hollow-pointed stylus, made to conform to the raised dots, and special vinyl paper are required for writing with the simplified slate. She reported tests to determine the correct dot radius for both the slate and the hollow point of the stylus. The new slate was then tried with 10 grade-three pupils who had had no previous instruction in the use of the conventional slate and stylus. After six months of instruction with the new slate, the experimental group was compared with a control group of 9 grade-three and 12 grade-four pupils who had received instruction in braille writing using the conventional slate. Using speed writing test of three minutes duration, in which the pupils were instructed to write a stimulus word repeatedly, Barr reported the results shown in Table 2.

Table 2

Writing Speeds Using Two Different Types of Slates
as Reported by Barr

Writing Method	Rows Written	Words Written	Words Written Less Errors
Simplified Slate	11.2	88.1	68.7
Conventional Slate	8.52	96.3	72.3

Using t tests to compare group means, Barr found no significant difference between the groups as to braille writing ability in any of the categories tested. She concluded that pupils instructed in braille writing using the simplified slate had developed writing ability similar to that of pupils instructed using the conventional slate. Even though she claimed several advantages, such as eliminating the necessity of teaching pupils to write backwards, she recommended further research concerning the apparatus.

Rawls and Lewis (1961) conducted a survey to determine the most efficient way of teaching braille writing in respect to the apparatus used. Teachers from 71 educational programs for visually handicapped children participated in the survey. They reported the following results. Nearly 68 percent of the schools surveyed began instruction of braille writing during the first half of grade one. Almost 93 percent began writing instruction using the Perkins or some other make of braillewriter. Instruction in writing using the slate and stylus was most frequently begun in grade three. A majority of the schools reported that braille reading and writing instruction was begun simultaneously. On a question concerning the number of words, letters, and signs known at the end of grade one, the surveyors considered the replies received too inconclusive to tabulate.

Most all of the descriptive articles on braille writing

are concerned with its instruction in the beginning stages. Bennett (1936) stressed the need for practice and repetition in learning the symbols. Jones (1950) emphasized the value of rhythm in writing braille as an aid to speed and accuracy. Several have expressed opinions as to when instruction in braille writing should begin. Most agree with Maxfield (1928) that instruction should begin during the first year of school. This was reaffirmed by the Rawls and Lewis survey. Wilson (1955) pointed out the advantages of beginning instruction using a mechanical braillewriter which were reaffirmed by the Rawls and Lewis survey.

Several persons have made statements concerning the total braille writing instructional program. Except for Badgley, it would appear that most have based their statements on some combination of personal experience, opinions, practices and methods observed, and/or assumptions.

As to what is good braille writing, the following two statements are illustrative. Rodgers (1961) stated that the accurate writing of braille means adherence to the rules of English Braille and, that in rating any braille writing, we should consider the writer's accurate application of the rules of the braille code. Taking a completely different approach, the College of Teachers of the Blind (1936) concluded that the making of good clear dots is of primary importance, and that the correct use of contractions is

secondary to this point.

As to how many years of instruction in writing children should receive, Quimby (1940), who conducted a residential school curriculum survey during the 1930's, reported that no school continued to treat writing as a subject after grade four. No such survey has been made in recent years; but with the trend toward greater correlation of subject matter since that time, it would be fairly safe to assume that Quimby's findings would probably be true at the present time. Badgley disagreed with this policy. She reported an excessive misuse of contractions by pupils in the higher grades, and stated that four years of writing instruction is not adequate to produce accurate braille writing pupils.

On the subject of how children best learn to write accurate braille, braille which is properly contracted and adheres to the rules, two divergent approaches are expounded. Lorimer (1962), Ashcroft and Henderson (1963), Niday, Rice, and Chatfield (1950), and the College of Teachers of the Blind (1936) all stated that through their reading and writing experiences, children gradually acquire an adequate knowledge of the braille contractions and the rules which govern their use. It would appear that this approach would require the child to gain much of his knowledge about braille writing through incidental learnings. Badgley (1940) again took a different approach. She contended that no part

of children's learning to write braille should be taken for granted, and thus there is a need for continued formal instruction if the child is to learn to write accurate braille.

After reviewing the literature on the subject of braille writing, one cannot help but agree with Carl T. Rodgers, there does appear to be a need for research concerned with the subject of braille writing.

The Literature on Related Language Arts Skills

The related areas of concern to the present study were braille reading and spelling. The relationship between reading and writing, whether it be print or braille, is quite easily seen; but the relationship between spelling and braille writing might not be so obvious to the person not familiar with Braille Grade 2. This relationship will be discussed later in this section.

The literature reviewed contained reports of several studies concerned with various aspects of braille reading. This review will include only those studies concerned with that aspect of the reading process which has to do with recognizing and giving meaning to the braille symbols on the part of the reader. Parts of three studies concerned with this aspect of reading are reported here.

Ashcroft (1960) reported on the oral reading of braille by elementary school children. He made a systematic count

of the oral reading errors made by 728 children reading 6,433 paragraphs containing 543,065 words. The errors counted were classified in two different ways. The first classification contained seven categories as determined by Braille Grade 2 orthography. He found that the two categories with the greatest magnitude of difficulty were the short form word contractions and the multiple cell contractions. These two categories, when their error totals are combined, contributed 39 percent of all the errors counted. Of the 145 additional Braille Grade 2 contractions, these two categories contribute 123 in number.

The second classification of errors was on the basis of the types of reading errors made by the children. A total of 10,933 errors were classified in eight categories. The category of concern here is the one named association errors and defined as those errors in which an erroneous word response was associated with the braille contraction symbol. Ashcroft pointed out that such errors would usually involve memory of the orthographic symbology. The association error category contributed 1,358 errors or 12.4 percent of all the errors classified in the eight categories.

When considering Ashcroft's results, no matter which method of classification is used, one point is noted. Errors either caused by children's inability to remember the braille contraction symbols or a lack of knowledge of the

symbols used in braille contributed a significant proportion of the total number of errors made by his subjects in their reading. It would only seem logical to assume that these types of errors would appear equally as often, if not more often, in children's braille writing where the entire process depends upon a knowledge of and the ability to remember the braille symbols.

Woodcock and Bourgeault (1964) reported on the construction and standardization of a series of braille skill tests known as the Colorado Braille Battery. Its purpose was to assess a person's knowledge of the braille codes, both literary and Nemeth, by having the subject select the one braille symbol out of five choices which corresponds to the oral stimulus furnished by the examiner. In brief, it is a braille symbol recognition test without the benefit of context.

For present purposes, the concern was an analysis of the normative data for the Advanced Literary Test, a test designed and normed for use with persons from grade four and up. The test norms were based on the performances of children enrolled in educational programs for the visually handicapped. The grade level equivalents given in the norm tables were based on median scores which means that a full 50 percent of the normative population for any grade level had to score poorer than grade level. Consider the norms

for late grade four, the point in the lives of most children when formal instruction in braille writing is about to cease. On Form A, which contains 58 items, for a child to score fourth grade, seventh month, he must give 33 correct responses or he may miss 25 items or 43.1 percent of the items. Form B has the same number of items, but it allows only 19 incorrect responses or 32.8 percent failure to score fourth grade, seventh month. This is basically a reading test, and for most children braille writing is inherently more difficult than braille reading.

Henderson (1967) conducted a study to determine the effect of training in the recognition of the different one-cell braille symbols on the reading ability of children. Pretesting included measures of speed and accuracy in recognizing one-cell braille symbols, speed and accuracy of oral reading, and speed and rate of comprehension in silent reading. The treatment group was then given training in recognizing the braille symbols followed by posttesting of both the treatment and control groups using measures similar to those administered during pretesting. Comparisons of the group means revealed significant gains by the treatment group in speed and accuracy of symbol recognition, and speed of oral reading. From the results observed, she concluded that training in symbol recognition did produce a significant increase in rate and accuracy of the total reading

process for the children in the treatment group. One might assume that similar training could also improve children's writing ability.

To understand the relationship between spelling and braille writing, first consider the sighted child and his spelling. In his reading, he sees all of the words spelled out. When he wishes to write a word and to spell it correctly, he is able to rely to some extent on visual memory; that is, he tries to see in the "mind's eye" the word as he has seen it spelled correctly in reading. The use of contracted Braille Grade 2 in reading materials for blind children eliminates this aid in spelling to some extent. Exactly how many English words are affected in their spelling by the use of the braille contractions is unknown; however, Goldish (1967) reported that contracted braille requires only about 60 percent as much space as would be needed for the full spelling of every word, Braille Grade 1. This space saving is accomplished by substituting contractions for letters, parts of words, and whole words, words the blind child may never encounter in their full spelling.

Several people have suggested that braille writing does have an effect on the spelling ability of blind children. Brown (1950) stated that the need of learning to adjust to braille for reading and writing can be a factor in a child's ability to learn to spell. Niday, Rice, and Chatfield (1950)

reported that there appears to be some truth to the belief that contracted braille prevents users from becoming proficient spellers. Rodgers (1961) suggested that there was a need for systematic testing to determine the effect of reading contracted braille on a child's ability to learn to spell. One study in this area has been reported.

Godshall (1961) reported an analytic study of the spelling habits of braille reading pupils. Her subjects were 227 pupils whose grade placement ranged from grade three to grade nine in eight residential schools. No child's chronological age was more than one year and 10 months above the normally expected mean chronological age for any particular grade placement. Two graded spelling lists were used at each grade level: the Stanford Achievement Tests list and the Metropolitan Achievement Tests list. Each child was administered both lists for his grade level. He was instructed to spell each word using full spelling and in its contracted form if any braille contractions applied. The mean number of words spelled correctly on each list by the total population is shown in Table 3.

Godshall concluded that blind children do not spell as well when they write using Braille Grade 2, and that the use of contractions does seem to influence the type of spelling errors made by the children.

Table 3
Spelling Results on Stanford and Metropolitan Tests
as Reported by Godshall

Test	Full Spelling	Contracted Spelling
Stanford	41 correct	27 correct
Metropolitan	35 correct	22 correct

Summary

A review of the literature revealed that very little has been written or said about braille writing, and that even less has been done to determine if the methods and practices used in its instruction are the most efficient. An attempt was made to show how some of the research dealing with braille reading might be analyzed so as to indicate the direction for research on braille writing. Research which affirmed the assumed relationship between spelling and braille writing was included.

Procedures

The purpose of this study was to determine how accurately children in the fifth and sixth grades of a residential school for the blind write Braille Grade 2, to determine if a course in braille writing would improve significantly children's ability in this skill, and to

determine what effects instruction in braille writing would have on children's performances in some of the related language arts skills. To do this, it was necessary to obtain a sample population and assign the subjects to either a treatment or control group. Individual performance was sampled on five variables of concern. The subjects assigned to the treatment group were then given instruction in braille writing, and during this time all other instructional factors were held as constant as possible. The final step was again to sample individual performance on the five variables of concern, and to compare the group results to determine if the treatment had been responsible for any difference in the growth rates of the subjects assigned to the two groups.

This section describes the subjects who participated in the study, the measures of assessment used, and the methods and materials used in the lessons which comprised the treatment.

The Subjects

The subjects for the study were 20 braille-reading pupils enrolled in grades five and six at the Overbrook School for the Blind. Every subject had attended the school since entering grade one, and Braille Grade 2 had been used as the basic instructional medium for all of the subjects.

Individual chronological ages were determined as of the date that the study began. The subjects' ages ranged from 10 years, 7 months, to 16 years, 1 month, with a mean age of 12 years, 10 months, for the total population.

The sample contained 10 girls and 10 boys. Eight subjects, 6 girls and 2 boys, were enrolled in grade six, and 12 subjects, 4 girls and 8 boys, were enrolled in grade five.

Individual achievement scores and scores on measures of intellectual assessment were not considered to be essential to the study and were not obtained by the investigator.

It was necessary to assign 10 subjects to a treatment group and 10 subjects to a control group. The assignment was accomplished by a random drawing of names. Table 4 provides the pertinent information in regard to the subjects assigned to each group. Each group contained 6 grade-five pupils and 4 grade-six pupils. The subjects assigned to the control group were on the average seven months older than the subjects assigned to the treatment group. Each group consisted of 5 girls and 5 boys.

The groupings used for the study did not apply to any other aspects of the subjects' educational program. The pupils attended all regularly scheduled classes together and lived in the same cottages. It would then appear that differences in the growth rates of the two groups could, for

the most part, be attributed to the treatment used.

Table 4
The Subjects Assigned to the Groups

Treatment Group				Control Group			
Subject	Sex	Age in Months	Grade	Subject	Sex	Age in Months	Grade
E1	M	162	6	C1	M	144	5
E2	F	175	6	C2	F	165	6
E3	M	128	5	C3	M	160	6
E4	M	127	5	C4	M	178	5
E5	F	168	6	C5	F	151	6
E6	F	165	5	C6	M	138	5
E7	F	158	6	C7	F	193	6
E8	M	147	5	C8	M	145	5
E9	M	141	5	C9	F	142	5
E10	F	140	5	C10	F	160	5
Means		151				158	

Measures of Assessment

Four measures were administered to all subjects, and five scores assessing braille writing accuracy, reading comprehension, oral reading errors, oral reading rate, and spelling were obtained.

The braille writing test. The measure used to assess braille writing accuracy was the final Braille Proficiency Self-Test in Programmed Instruction in Braille by Ashcroft and Henderson (1963). Permission to adapt the test for use in this study was obtained from the authors. The three-part test was designed for use with sighted adults learning braille and is ordinarily displayed in facsimile or ink-print braille. In the adaptation used, Part One, which consists of 30 words to be written in Braille Grade 2, was embossed in Braille Grade 1. The same procedure was used for Part Two which contains 10 sentences to be written in Braille Grade 2. Part Three is a paragraph ordinarily displayed in an ink-print facsimile of Braille Grade 2. The paragraph contains eight orthographic braille errors which the subject is instructed to locate and to write the incorrect words or phrases correctly. This part was embossed and administered in the manner recommended by the test's authors.

The following procedures were used in scoring the subjects' test papers. One error was counted for each word written incorrectly in Part One. In Part Two any misuse of a contraction in a word caused that word to be counted as one error. It was considered to be a misuse of a contraction if the subject failed to use a contraction when he should have, if the subject used a contraction when he should not have, or if the subject used an incorrect

contraction symbol. Also counted as errors in Part Two was the misuse of three different braille composition signs, each of which appeared once. Failure by the subject to locate and correct an orthographic error was counted as one error in Part Three. A subject's final score was determined by the total number of errors made in all parts of the test.

It is difficult to specify the exact number of possible errors in the test. An estimate of approximately 130 to 140 was arrived at when the investigator counted the number of words which require the use of contractions and the words in which the use of a contraction would violate some specific rule.

The reading comprehension test. A measure of this variable not familiar to the subjects was desired. Permission to transcribe to braille a section of the Iowa Tests of Basic Skills (Lindquist & Hieronymus, 1964) was obtained from one of the co-authors. The first half of Test R: Reading Comprehension of Level C, Form 3, was used. The test administered to the subjects contained five short passages with 36 multiple choice items based on the content of the passages. The individual scores reported represent the number of incorrect responses by a subject.

The oral reading test. The measure used to assess oral reading ability was Paragraph 5B of the Diagnostic Reading

Scales by G. D. Spache (1963). The publisher, California Test Bureau, granted special permission for this material to be transcribed to braille for use in the study. Individual administrations of the instrument yielded an oral reading errors score and an oral reading rate score. The oral reading errors scores represent a subject's total of the five error types counted. Errors were counted for words substituted, words omitted, words inserted, words the subject could not recognize without aid, and repetitions of two or more words by a subject. The oral reading rate scores reported were obtained by timing each subject's reading of the paragraph and computing the number of words read per minute.

The spelling test. A 50 word dictation test was used as the measure of spelling ability. The 50 words were randomly selected from the 184 words that appear in Test L-1: Spelling of the Iowa Tests of Basic Skills (Lindquist & Hieronymus, 1964), Level D, Form 3. A list of the 50 words used is included in Appendix B. To administer the test, each word was pronounced, used in a sentence, and repeated by the examiner. The subjects were instructed to write each word using its full spelling. Individual scores were determined by the number of words spelled incorrectly by a subject.

Pretreatment Testing

The measures described above were administered to all 20 subjects during the week prior to the beginning of the treatment. The braille writing, reading comprehension, and spelling tests were administered as group tests. The oral reading test was administered individually. In all cases, each subject was supplied with an individual copy of the test materials.

Materials and Methods Used in the Treatment

The major emphasis of the treatment was instruction in the use of Braille Grade 2 contractions in writing. Groups of contractions, with similar rules for their use, were presented in order of difficulty.

Materials. A series of 16 lessons dealing with the rules of Braille Grade 2 was prepared using the 1962 revised edition of English Braille American Edition as the basic reference. Each lesson included the rules governing correct usage of a particular group of contractions. The material covered in each lesson is shown in Table 5.

Each lesson contains an instructional section and writing exercises. The instructional section includes an introduction which lists and explains the group of contractions to be studied, and the rules which govern the use of the contractions. Each rule is followed by examples

Table 5
Contents of the Lessons

Lesson	Lesson Content
1	The alphabet, and one-cell whole and part word contractions
2	The lower-sign whole word contractions for be, enough, were, his, in, and was.
3	The lower-sign whole word contractions for to, into, and by
4	The lower-sign initial part word contractions for be, com, con, and dis
5	The lower-sign interior part word contractions for ea, bb, cc, dd, ff, and gg
6	The lower-sign part word contractions for en and in, and review of the lower-signs
7	The two-cell, initial letter contractions that are preceded by dot 5
8	The two-cell, initial letter contractions that are preceded by dots 4 and 5 or dots 4, 5, and 6
9	The two-cell final letter part word contractions
10	General rules for contraction usage and a review of the two-cell contractions
11	The short form word contractions that begin with A and B
12	The short form word contractions that begin with C to N
13	The short form word contractions that begin with O to Y
14	The braille punctuation marks

Table 5 (Continued)

Lesson	Lesson Content
15	The braille composition signs
16	Abbreviations and special numerals as used in literary braille

illustrating that particular rule. The writing exercises contain sentences in which all contractions in the group being studied must be used. They also provide practice in using contractions studied in previous lessons. An attempt was made to refrain from including in the writing exercises any words which would require the use of contractions that would be studied in later lessons.

Due to the nature of the content presented in the last three lessons, it was necessary to use a slightly different approach in preparing the writing exercises for these lessons.

All lessons were transcribed to braille with the instructional sections appearing in Braille Grade 2 and the writing exercises appearing in Braille Grade 1. Each subject in the treatment group was furnished with a Thermoform copy of the lessons during each teaching session. An ink-print copy of one of the lessons is included in Appendix C.

Methods. The 10 subjects in the treatment group met with the investigator after school one afternoon a week for 16 weeks. The scheduled lesson period was one hour and a half in duration.

The lesson procedure was for the pupils and the investigator to read orally the instructional section of the lesson. Extra explanations of specific rules were given, and the subjects were encouraged to ask questions and to discuss the rules and examples presented. When there were no further questions concerning the instructional section of the lesson, the investigator would read orally the sentences in the writing exercises so that the subjects would not experience any undue difficulty with the vocabulary content of the sentences. The subjects then wrote all of the sentences in Braille Grade 2.

Each subject's work was checked and returned to him with a sheet indicating his errors at the beginning of the succeeding lesson.

All braille written work turned in by any subject during the study was done using a pocket slate and stylus.

All work completed by each subject, whether during testing or treatment lesson sessions, was accepted as his best effort, and no attempt, other than this, was made to regulate or to control the variable of motivation.

Posttreatment Testing

One week after the final treatment lesson, all of the measures described previously were readministered to each subject. The procedures used during posttesting were as similar as possible to those used during pretesting. The time lapse between pretesting and posttesting was 17 weeks.

Results

The purpose of this study was to determine how accurately elementary school children write Braille Grade 2, to determine if a course in braille writing would improve significantly children's ability in this skill, and to determine what effects instruction in braille writing would have on children's performances in some of the related language arts skills. This section presents the results obtained using the measures of variability administered to the subjects in the study.

The Braille Writing Test

To gain some insight in regard to the first two concerns of the study's purpose, the results of the braille writing test were considered in two ways. First, to determine how accurately the subjects wrote using Braille Grade 2, the results of the total sample population on the pretreatment administration of the test were considered. Second, to determine if a course in braille writing would improve

significantly the subjects' ability in this skill, the growth rates of the treatment and control groups were compared.

The results of the pretreatment administration of the braille writing test are shown in Table 6. The individual scores ranged from 8 errors to 127 errors with a mean error score of 67.45 and a standard deviation of 37.81 for 20 subjects. An estimate of 130 to 140 possible errors for the test and an explanation of how the estimate was obtained was reported previously. Using this estimate, the observed mean error score would yield a mean percentage score of approximately 50 percent correct.

Table 6

Results of the Pretreatment Braille Writing Test

Number of Subjects	Mean Score*	Standard Deviation
20	67.45	37.81

*Mean represents scores based on number of errors.

The results of the treatment and control groups on the two administrations of the test are given in Table 7. Also shown is a gain score which represents each group's decrease in errors or improvement from the time of pretesting until the time of posttesting. It was this score that was used

as a measure of growth rate for group comparisons in the study. From pretesting to posttesting the treatment group reduced their mean error total by 32.1 percent, while the control group had only 6.7 percent fewer errors. Tables which show individual subject's results on all tests are included in Appendix A.

Table 7
Group Results on the Braille Writing Test

Group	Pretest		Posttest		Gain Score	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Control	62.9	42.85	58.7	38.21	4.2	9.53
Treatment	72.0	33.71	48.9	32.96	23.1	11.28

The gain score means of 23.1 for the treatment group and 4.2 for the control group were compared using a t test. The computations for this comparison are given in Table 8. The observed t value of 4.048 with 18 degrees of freedom indicates that the difference between the gain score means of the two groups is significant beyond the .01 level.

Validity and reliability data for the writing test were not available to the investigator. The purpose of the test, the assessment of a subject's braille writing ability by requiring that he write common words used in meaningful

Table 8

t Test Comparison of the Gain Score Means in Writing

Group	$\sum x$	$\sum x^2$	N	\bar{x}	s^2
Control	42	994	10	4.20	90.84
Treatment	231	6481	10	23.10	127.21

$$\bar{x}_e - \bar{x}_c = 18.90$$

$$s^2 = 109.0250$$

$$s\bar{x}_e - \bar{x}_c = 4.6695$$

t value with p less

$$\underline{t} = 4.048 \quad df = 18$$

than .01 = 2.878

sentences, would indicate that it has both face and construct validity. Content validity is indicated by the fact that the test samples a subject's knowledge of the correct use of 82 of the 189 braille contractions. To determine the reliability of the test, correlations of the pre- and post-test results yielded the following r's: total population $r = .928$ with $n = 20$, control group $r = .979$ with $n = 10$, and treatment group $r = .943$ with $n = 10$. All three correlations were significant beyond the .01 level and indicate that the test possesses good test-retest reliability.

The Reading Comprehension Test

The group results for the test of reading comprehension are shown in Table 9. Between administrations of the test, the treatment group reduced its error total by 13.1 percent, while the control group reduced its error total by 12.2 percent. A t test comparison of the gain score means revealed no significant difference in the growth rates of the groups.

Table 9

Group Results on the Reading Comprehension Test

Group	<u>Pretest</u>		<u>Posttest</u>		<u>Gain Score</u>	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Control	21.3	7.69	18.7	7.72	2.6	5.85
Treatment	22.1	7.55	19.2	6.96	2.9	5.24

The extensive research carried out in the selection of items for the Iowa Tests of Basic Skills has been praised by all reviewers (Boros, 1959) and the reported validity for the tests as a measure of reading ability has been widely accepted. The normative population for the tests was one of the largest and most representative ever used in the standardization of an achievement battery. Test-retest reliability coefficients reported for the battery range from .97 to .98.

The Oral Reading Test

The oral reading test yielded two different scores for the subjects in each group: an oral reading errors score and an oral reading rate score. Tables 10 and 11 show the group results for these two sets of scores.

Table 10

Group Results on the Oral Reading Errors Test

Group	Pretest		Posttest		Gain Score	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Control	12.3	7.96	10.2	6.27	2.1	4.43
Treatment	11.0	8.37	9.9	9.12	1.1	5.32

Table 11

Group Results on the Oral Reading Rate Test

Group	Pretest		Posttest		Gain Score	
	Mean*	S.D.	Mean*	S.D.	Mean*	S.D.
Control	66.2	42.72	73.8	43.44	7.6	5.20
Treatment	61.9	22.63	72.2	22.45	10.2	6.46

*Means indicate reading rates in words read per minute.

On the oral reading errors test the gain score mean of 1.1 represents a 10.0 percent decrease in total errors for the treatment group, and the gain score mean of 2.1 shows a decrease in total errors of 17.1 percent for the control

group. A t test comparison of the gain score means revealed no significant difference in the growth rates of the groups.

On the oral reading rate test, the gain score mean of 10.2 wpm represents an increase of 16.5 percent in oral reading rate for the treatment group, while the gain score mean of 7.6 wpm shows an 11.5 percent increase in oral reading rate for the control group. Again a t test failed to reveal any significant difference in the growth rates of the groups.

The preparation of the Diagnostic Reading Scales included careful selection of vocabulary and consideration of sentence structure to be used followed by comparisons of the material with established reading scales to insure content and construct validity. A concurrent validity coefficient of .77 for the Level Five paragraphs was obtained in a comparison with the California Reading Test. A test-retest reliability coefficient of .84 has been reported for the reading passages used in the test (Spache, 1963).

The Spelling Test

Group results for the spelling test are shown in Table 12. The treatment group's gain score mean of 6.6 represents a 27.5 percent decrease in total errors, and the gain score mean of 2.7 represents a 13.4 percent decrease in errors for

Table 12
Group Results on the Spelling Test

Group	Pretest		Posttest		Gain Score	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Control	20.1	11.61	17.4	10.83	2.7	3.23
Treatment	24.0	12.53	17.4	9.97	6.6	3.84

the control group. These means were compared, using a t test as shown in Table 13.

Table 13
t Test Comparison of the Gain Score Means in Spelling

Group	$\sum x$	$\sum x^2$	N	\bar{x}	s^2
Control	27	167	10	2.70	10.46
Treatment	66	568	10	6.60	14.71

$$\bar{x}_e - \bar{x}_c = 3.90$$

$$s^2 = 12.5850$$

$$s\bar{x}_e - \bar{x}_c = 1.5865$$

$$\underline{t} = 2.458 \quad df = 18$$

t value with p less
than .05 = 2.101

The observed t value of 2.458 with 18 degrees of freedom indicates that the difference between the gain score means is significant at the .05 level.

The items used in the spelling test were selected from Test L-1: Spelling of the Iowa Tests of Basic Skills, Level D, Form 3 (1964). Thus the test would appear to possess content and face validity. To determine the test's reliability, the following test-retest coefficients were obtained: total population $r = .947$ with $n = 20$, control group $r = .960$ with $n = 10$, and treatment group $r = .967$ with $n = 10$. All three correlations were significant beyond the .01 level which indicates that the test possesses good test-retest reliability.

Correlations

A premise of this study was that certain language arts skills are related to braille writing ability. To ascertain the validity of this premise, the pretest results of the measures of reading comprehension, oral reading errors, oral reading rate, and spelling were correlated with the results of the pretest of braille writing. The Pearson Product-Moment Correlation formula was used. The correlation coefficients obtained were tested for significant using the formula

$$\underline{t} = \frac{r}{\sqrt{1 - r^2}} \sqrt{n - 2}$$

as described by Edwards (1967). Table 14 shows the correlation coefficients obtained along with their respective t values.

Table 14
Pretest Correlations

Measures	r's	<u>t</u> values
Writing and Reading Comprehension	.687	4.010
Writing and Spelling	.799	5.639
Writing and Oral Reading Errors	.559	2.860
Writing and Oral Reading Scale	-.735	-4.599

Note: p is equal to or less than .01 for the t value 2.878, $df = 18$.

The t values with 18 degrees of freedom are all significant beyond the .01 level indicating that all of the correlations are significantly different from zero. The negative correlation between writing and oral reading rate is explained by the fact that writing improvement is indicated by a decrease in errors, while reading rate improvement is indicated by an increase in the number of words read per minute.

The study was concerned only with general overall performance on the variables assessed, and no analyses to

determine effects on specific error types were done on the results of any of the measures administered during the study.

Conclusions

How accurately do elementary school children write Braille Grade 2? How will a course in the rules of Braille Grade 2 affect the writing ability of elementary school children? How will instruction in the rules of Braille Grade 2 affect elementary school children's abilities in reading comprehension, oral reading, and spelling? These are the questions this study was designed to investigate. The group used in the study was quite small, but if the sample is considered to be representative of the total population of concern, it is possible to draw certain conclusions on the basis of the observed results. It is hoped that broader and more analytical studies of the problem may be attempted in the future so as to ascertain further the validity of the findings.

First, how accurately do elementary school children write Braille Grade 2? The scores obtained by the subjects on the pretreatment administration of the writing test would indicate but one answer: not very accurately. The test used contains approximately 130 to 140 possible errors if errors are counted only for the misuse of contractions and composition signs. The 20 subjects in the sample made an

average of 67.45 such errors on the test. Approximately 50 percent of their work was incorrect.

The test used, although designed for use with adults, because of its simplicity, appears to be appropriate for use with children of the age and grade placement of the subjects. The test has construct, content, and face validity for the purpose. A vast majority of the error words, words which represent a potential error on the test since some knowledge of braille contractions and their rules must be possessed in order to write them correctly, are words normally found in the reading and writing vocabularies of elementary school children. The alphabet contractions along with the contractions and, of, the, and for contribute 34 of the error words. Fifty-six of the error words require that the subject possess only a knowledge of upper-sign, one-cell contractions of braille. Approximately one-half of the remaining error words appear in the basic reading materials used with children at or before grade four. Also indicative of the fact that the test was appropriate are the cases of the four subjects who made fewer than 20 errors.

Lack of ability to spell should not have caused undue problems for the subjects in taking the test. The test materials provided each subject contained the correct full spelling of every word whether it was to be contracted or not in his writing.

These facts are the basis of the conclusion that the results of the pretreatment braille writing test indicate that such children do not write Braille Grade 2 accurately.

Second, how will a course in the rules of Braille Grade 2 affect the writing ability of elementary school children? The results of the study show that such instruction was beneficial to some degree for all of the treatment group subjects, but the results also show that such a brief course cannot be expected to entirely eliminate the problem of inaccurate braille writing. Every subject in the treatment group showed improvement after instruction, and 90 percent of the treatment subjects exhibited more improvement than all but one of the subjects in the control group. It is also pointed out that on the basis of the pretest group means, prior to instruction the subjects in the treatment group appear to have achieved less than the subjects in the control group as witnessed by the group means of 72 errors for the treatment subjects as contrasted with 63 errors for the control subjects.

Third, how will instruction in the rules of Braille Grade 2 affect children's performances in reading comprehension, oral reading, and spelling? The growth rate comparisons made indicate that such instruction tended to have only minimal effects on the various aspects of reading ability of the subjects. The only aspect of reading in

which the group mean difference approached significance was oral reading rate. The significant correlations obtained indicate a close relationship among these skills, but the writing instruction did not appear to contribute to any great degree to improvement in reading as measured by the tests used.

The observed effect of the writing instruction on spelling ability helps to confirm the often reported belief that the use of contracted braille affects the spelling ability of blind children. The significantly greater gain in this skill by the treatment group is a finding which might well be the subject for future investigation. A more complete knowledge of just what factors contribute to the relationship between spelling and braille writing could be of value in future curriculum planning.

What implications for educators of blind children can be found in the results of this study? It would appear that current practices in the instruction of braille writing are not adequate for developing this skill in such children as were included in the present study. To the extent that these children can be considered representative, then the problem as stated in this report does exist; current practices used in the teaching of braille writing do not appear to meet the needs of some children, thus some do not write accurately. It would then appear that current instructional

practices need to be reviewed.

What are some questions to be considered when evaluating the practices used in teaching braille writing? Does the elementary school curriculum include systematic instruction in using the various types of braille contractions in writing? Accurate writing, using a medium as complex as the braille code, is a difficult skill for a child to master. The curriculum should provide an on-going writing instructional program in which the elements of the braille code are presented in order of difficulty. The blind child needs continued instruction in braille writing as much as, if not more than, the sighted child needs continued instruction in penmanship throughout the elementary school curriculum.

Is each child's work evaluated regularly for accuracy in braille writing? In other skills a child's work receives regular evaluation in order to determine his instructional needs. Why not his braille writing?

What criteria are used to determine if a child has mastered the skill of accurate braille writing? Most schools have established minimum standards at each grade level for other skills. The establishment of such standards for braille writing could be of much help. The use of writing proficiency tests, based on such standards, would make it possible to determine if a child has attained adequate proficiency in the skill.

Is there a program of remediation available for the child who has not mastered the skill when he reaches the upper elementary grades? A program of remediation designed to help such children improve this skill should be a part of the curriculum. The present study provides a plan and instructional materials that are useful for this purpose.

Summary

Twenty braille-reading subjects enrolled in grades five and six of a residential school for the blind were administered tests in braille writing, reading comprehension, oral reading, and spelling. Ten subjects were randomly assigned to a treatment group and attended 16 sessions of instruction in writing correctly in braille. They were instructed in the rules of the braille code and given opportunity to practice the application of the rules through writing exercises. All subjects were given the same tests as posttreatment measures.

The results of the pretesting and posttesting indicate three things. First, at the beginning of the project a majority of the subjects did not write braille accurately, with some failing to write adequately for their age, grade, and ability levels. Second, the treatment group improved in braille writing ability significantly more than the control group. Third, the instruction in braille writing

not only improved the subjects' ability in this skill but also appeared to have a positive effect on the spelling ability displayed by the subjects.

A major conclusion of the study was that current practices used in the instruction of children in braille writing do not appear to be satisfactory for such children and need to be reviewed.

REFERENCES

References

- American Association of Instructors of the Blind and American Association of Workers for the Blind. English braille American edition. Louisville, Ky.: American Printing House for the Blind, 1962.
- American Foundation for the Blind. Research index. New York: American Foundation for the Blind, 1968.
- Ashcroft, S. C. Errors in oral reading of braille at elementary school levels. Unpublished doctoral dissertation, University of Illinois, Urbana, 1960.
- Ashcroft, S. C., & Henderson, F. M. Programmed instruction in braille. Pittsburgh: Stanwix House, 1963.
- Badgley, G. When and how should braille writing be taught? Proceedings of American Association of Instructors of the Blind, 1940, 178-82.
- Barr, R. L. Developing and evaluating a simplified braille writing device. The New Outlook for the Blind, May, 1968, 62, 5, 148-52.
- Bennett, B. B. Most effective methods of teaching braille writing. Proceedings of American Association of Instructors of the Blind, 1936, 57-8.
- Boros, O. K. The fifth mental measurements yearbook. Highland Park, N. J.: The Gryphon Press, 1959.
- Brown, M. L. Spelling helps. Proceedings of American Association of Instructors of the Blind, 1950, 224-27.
- College of Teachers of the Blind. The teaching of braille in our schools. In Handbook for school teachers of the blind. Bristol, England: St. Stephen's Bristol Press, 1936.
- Edwards, A. L. Statistical methods. New York: Holt, Rinehart and Winston, Inc., 1967.
- Farrell, G. Avenues of communication. In P. A. Zahl (Ed.), Blindness. Princeton, N. J.: Princeton University Press, 1950.

- Godshall, L. W. Analysis of spelling behavior of braille reading children. Unpublished independent study, George Peabody College for Teachers, Nashville, Tenn., 1961.
- Goldish, L. H. Braille in the United States: Its production, distribution, and use. New York: American Foundation for the Blind, 1967.
- Henderson, F. M. The effect of character recognition training on braille reading. Unpublished independent study, George Peabody College for Teachers, Nashville, Tenn., 1967.
- Hooper, M. S. Braille contractions and children's vocabularies. Proceedings of American Association of Instructors of the Blind, 1946, 18-41.
- Irwin, R. B. The war of the dots. As I saw it. New York: American Foundation for the Blind, 1955.
- Jones, M. Rhythm in braille writing. Proceedings of American Association of Instructors of the Blind, 1950, 228-30.
- Kugelmass, J. A. Louis Braille, windows for the blind. New York: Julian Messner, Inc., 1951.
- Langan, P. J. The early introduction of grade two braille. Proceedings of American Association of Instructors of the Blind, 1950, 82-84.
- Lende, H. Books about the blind: A bibliographical guide to literature relating to the blind. New York: American Foundation for the Blind, 1953.
- Lindquist, E. F., & Hieronymus, A. N. Iowa tests of basic skills. State University of Iowa. Boston: Houghton Mifflin Co., 1964.
- Loomis, M. S. Standard English braille in twenty lessons. New York: Harper and Bros., 1934.
- Lorimer, J. Braille as a reading medium. Proceedings of International Conference of Educators of Blind Youth. Brattleboro, Vt.: Vermont Publishing Co., 1962, 126-32.

- Lowenfeld, B., Abel, G., & Hatlen, P. H. Blind children learn to read. Springfield, Ill.: Chas. C. Thomas, 1969.
- Maxfield, K. E. The blind child and his reading. New York: American Foundation for the Blind, 1928.
- Niday, W. R., Rice, R., & Chatfield, A. Uniform procedures in teaching braille. Proceedings of American Association of Instructors of the Blind, 1950, 223-24.
- Quimby, N. F. A study of the curriculum for residential schools for the blind. New York: American Foundation for the Blind, 1940.
- Rawls, R. F., & Lewis, E. E. Braille writing in schools and day classes for the blind in the United States. Internat. Jour. Educ. Blind, December, 1961, 11, 2, 42-46.
- Ricksecker, C. W. To what extent are blind children educationally handicapped? The High School Teacher, September, 1932, 8, 7, 262-3.
- Roblin, Jean. Louis Braille. London: Royal National Institute for the Blind.
- Rodenberg, L. W., Irwin, R. B., & Meyer, G. F. Report of the special American Uniform Type Committee. Proceedings of the American Association of Instructors of the Blind, 1934.
- Rodgers, C. T. Recommendations for scientific investigation into problems of touch reading and related subjects. Proceedings of Conference on Research Needs in Braille, 1961.
- Spache, G. D. Diagnostic reading scales. Monterey, Calif.: California Test Bureau of McGraw-Hill Book Co., 1963.
- Wilson, M. Braillewriters for beginners. Internat. Jour. Educ. Blind, October, 1955, 5, 1, 13-14.
- Woodcock, R. W., & Bourgeault, S. E. Constructions and standardization of a battery of braille skill tests. Greeley, Colo.: Colorado State College, 1964.

Ziegel, H., & Ostendorff, M. Why make braille more difficult for beginners? Internat. Jour. Educ. Blind, June, 1953, 2, 4, 182-3.

APPENDIXES



APPENDIX A
INDIVIDUAL RESULTS

Table 15
Individual Results on the Braille Writing Test

Treatment Group				Control Group			
Sub- ject	Pre- test	Post- test	Gain*	Sub- ject	Pre- test	Post- test	Gain*
E1	49	41	8	C1	99	89	10
E2	19	6	13	C2	16	14	2
E3	74	53	21	C3	45	39	6
E4	50	14	36	C4	127	124	3
E5	77	35	42	C5	8	8	0
E6	109	78	31	C6	57	66	-9
E7	33	17	16	C7	19	22	-3
E8	88	57	31	C8	121	94	27
E9	99	79	20	C9	59	54	5
E10	122	109	13	C10	78	77	1
Totals	720	489	231		629	587	42
Means	72.0	48.9	23.1		62.9	58.7	4.2

*A decrease in errors represents a gain.

Table 16

Individual Results on the Reading Comprehension Test

Treatment Group				Control Group			
Sub- ject	Pre- test	Post- test	Gain*	Sub- ject	Pre- test	Post- test	Gain*
E1	13	23	-10	C1	26	21	5
E2	15	9	6	C2	7	13	-6
E3	13	9	4	C3	27	14	13
E4	20	14	6	C4	27	31	-4
E5	29	21	8	C5	10	4	6
E6	32	29	3	C6	21	18	3
E7	20	18	2	C7	18	14	4
E8	22	18	4	C8	22	24	-2
E9	23	24	-1	C9	31	23	8
E10	34	27	7	C10	24	25	-1
Totals	221	192	29		213	187	26
Means	22.1	19.2	2.9		21.3	18.7	2.6

*A decrease in errors represents a gain.

Table 17

Individual Results on the Oral Reading Errors Test

Treatment Group				Control Group			
Sub- ject	Pre- test	Post- test	Gain*	Sub- ject	Pre- test	Post- test	Gain*
E1	8	3	5	C1	11	10	1
E2	9	6	3	C2	9	11	-2
E3	9	11	-2	C3	7	3	4
E4	2	7	-5	C4	20	19	1
E5	2	4	-2	C5	2	1	1
E6	16	11	5	C6	17	19	-2
E7	8	1	7	C7	3	6	-3
E8	10	4	6	C8	11	7	4
E9	15	24	-9	C9	28	16	12
E10	31	28	3	C10	15	10	5
Totals	110	99	11		123	102	21
Means	11.0	9.9	1.1		12.3	10.2	2.1

*A decrease in errors represents a gain.

Table 18
Individual Results on the Oral Reading Rate Test

Treatment Group				Control Group			
Sub- ject	Pre- test	Post- test	Gain*	Sub- ject	Pre- test	Post- test	Gain*
E1	87.1	89.1	2.0	C1	51.5	64.2	12.7
E2	89.8	102.0	12.2	C2	72.4	79.1	6.7
E3	58.5	78.0	19.5	C3	75.6	82.3	6.7
E4	72.4	83.5	11.1	C4	48.3	47.2	-1.1
E5	74.6	87.8	13.2	C5	123.1	135.7	12.6
E6	53.3	63.5	10.2	C6	60.9	64.5	3.6
E7	80.7	81.8	1.1	C7	88.4	89.8	1.4
E8	38.3	48.1	9.8	C8	51.9	63.8	11.9
E9	22.8	26.5	3.7	C9	23.8	31.7	7.9
E10	41.9	61.2	19.3	C10	66.0	80.1	14.1
Totals	619.4	721.5	102.1		661.9	738.4	76.5
Means	61.9	72.2	10.2		66.2	73.8	7.6

*An increase in words read per minute represents a gain.

Table 19
Individual Results on the Spelling Test

Treatment Group				Control Group			
Sub- ject	Pre- test	Post- test	Gain*	Sub- ject	Pre- test	Post- test	Gain*
E1	28	16	12	C1	33	33	0
E2	9	6	3	C2	12	7	5
E3	31	23	8	C3	16	13	3
E4	6	5	1	C4	35	27	8
E5	17	10	7	C5	7	5	2
E6	24	17	7	C6	26	28	-2
E7	18	11	7	C7	0	2	-2
E8	39	30	9	C8	30	25	5
E9	22	21	1	C9	17	13	4
E10	46	35	11	C10	25	21	4
Totals	240	174	66		201	174	27
Means	24.0	17.4	6.6		20.1	17.4	2.7

*A decrease in errors represents a gain.

APPENDIX B

WORD LIST USED TO ASSESS SPELLING ABILITY

WORD LIST USED TO ASSESS SPELLING ABILITY

shone	section
pound	attend
clown	different
tablecloth	partners
tender	heaven
fixed	upright
might	spoil
children	convict
everybody	allow
taught	parent
afternoon	accent
twenty	spout
permission	although
dispose	movement
ownership	according
extended	guessed
search	ferry
dislike	worthless
shoulder	margin
mostly	witness
towel	source
devoted	target
period	contain
dissolved	vinegar
treaty	officer

SAMPLE LESSON

The next four lessons will be on the two-cell contractions. This lesson and lesson eight will cover the initial letter two-cell contractions, lesson nine will cover the final letter two-cell contractions, and lesson ten will be a general review of all of the two-cell contractions.

An initial letter contraction is one in which the first letter in the word that the contraction represents is preceded by either dot 5, or dots 4 and 5, or dots 4, 5, and 6.

1. The initial letter, dot 5, two-cell contractions are listed below.

. ∴ day	. ∴ one	. ∴ work
. ∴ ever	. ∴ part	. ∴ young
. ∴ father	. ∴ question	. ∴ there
. ∴ here	. ∴ right	. ∴ character
. ∴ know	. ∴ some	. ∴ through
. ∴ lord	. ∴ time	. ∴ where
. ∴ mother	. ∴ under	. ∴ ought
. ∴ name		

As whole word contractions, the dot 5 contractions may be used any time that the whole words they represent are to be written.

My mother and father work here part of the time.
 I know there is still one box under the table.
 That character did not know where he ought to be.
 I am through with that question and I know I'm right.

Name the one day that you want to/work for me.

2. The initial letter contractions may be used when prefixes and/or suffixes are added as long as the word that they represent is not altered in pronunciation.

unknow/ingly fatherly renamed depart/ing questionable
rightly timer unworkable young/er characters

They may not be used though, if their use with a suffix causes a misspelling of the word.

naming timing daily

3. These contractions may be used as part word contractions whenever they represent a syllable in a word which has approximately the same pronunciation as the whole word for which the contraction stands.

yest/er/day several fever grand/father fright/en
smother adhere sphere money pioneer handiwork
young/st/er partial partake hand/some blossomed
through/out maritime centimeter th/under
characteristic nowhere thereby bothered brought

4. When there is a choice between using a two-cell or a one-cell contraction, and the same amount of space will be saved, always use the one-cell contraction.

coher/ent, not coherent prisoner, not prisoner
opponent, not opponent boned, not boned

Examples to study--

Wh/en/ever there is a th/under/storm, my mother comes in here.

He has a character actor part in a one-act play.

Some/times my father is a part/time work/er for the Lord.

That lone/some young boy has just one name.

They were not quite right in question/ing that one this time.

Exercises to write--

1. The young man made some blunders.
2. Sometimes we work through the night.
3. Did you ever see a day when everything went just right?
4. Do you know where you ought to have bought it?
5. There are some large pine cones over here.
6. Anywhere my mother goes she is questioned concerning my name.
7. The cake for the party was done.
8. There were several minor characters in my book.
9. Sometimes I get some right.
10. We went to a party one day.
11. Father never questions me concerning my work.
12. Grandmother read us the part that we were questioned on.
13. The young undertaker was quite a bounder.
14. The Lord knows everything under the sun.
15. You made a real boner when you bought that one.
16. The workers were under here for a while yesterday.
17. There was one troublesome question on the test.
18. His departure was two days earlier than mine.
19. He reckoned that it was time to go to the party.
20. All of the bright students have been working very hard.

897
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